

A method is provided for forming contact/via hole openings without the detrimental volcano effect that is normally encountered in forming damascene structures. It is disclosed that the hole openings are needed to be filled with a protective material, in the first place, so as to prevent any damage to the exposed surface at the bottom of the openings. However, the filling material must be chosen properly, for otherwise, the material can leave behind a scum-like residue which then can erupt like a volcano during the subsequent process steps, which in turn can lead to functionality as well as reliability problems. It is disclosed in the present invention that when i-line photoresist (i-line PR), or, spin-on organic oxide is used as the protective filler material, the volcano effect can be avoided, and a Cu dual damascene interconnect with low RC delay characteristics can be obtained.